

REMARKS

Careful consideration has been given by the Applicants to the Examiner's comments in the rejection of the claims, and favorable reconsideration and allowance of the application, as amended, is earnestly solicited.

Applicants note the rejection of Claims 17-22 under 35 U.S.C. 103(a) as being unpatentable over Saunders, U.S. 5,531,876, in view of Ueda, JP 2002155356 (WO 02/20866 cited in an Information Disclosure Statement).

Furthermore, Applicants note the rejection of Claims 23-28 under 35 U.S.C. 103(a) as being unpatentable over Ueda in view of Ikeda, JP 01193463A as extensively detailed in the present Office Action.

However, upon careful consideration of the art, Applicants respectfully submit that irrespective as to whether the art is considered singly or in combination, the claims as presently on file are deemed to be directed to clearly patentable and substantially allowable subject matter.

In essence, prior to traversing the rejection of the claims based on the prior art, Applicants respectfully submit that the invention, as claimed, provides significant advantages over the state of the technology in that the clamping elements, which are employed in connection with the target support assembly, are fixed in position in the absence of requiring any further assembly and/or without having to implement any steps of fixing which are labor intensive. Thus, the present structure is highly economical in comparison with the welding or similar methods employed in the current state of the art. Furthermore, in comparison with the state of the art, the clamping elements of the present target support assembly are more sturdily constructed, because of their more compact shape, whereas the prior art provides for a clamping structure which can easily break off.

Moreover, the contact surface provided by the base arms of the clamping elements with the target carrier 2, 3 is greater than the somewhat point shaped bonding of the prior art as represented, for example, by Saunders. Consequently, any possibility of damage and/or of losing a holder means as the prior art is considerably reduced in a target support arrangement pursuant to the invention. In addition, the inventive clamping elements are more extensively protected against any breaking off, inasmuch as the clamping elements are concealed from the exterior located and wedged within a recess. This is clearly ascertainable by reviewing Saunders holding means in Figure 2 thereof in contrast with the holding means shown in Figures 4 and 5 of the target support assembly pursuant to the present invention.

In addition to the foregoing, when a target, as described in Saunders, is extensively utilized and thus exhausted, it is necessary to concurrently change the target and the backing plate inasmuch as the target is permanently bonded to the latter, whereas in contrast therewith, the target pursuant to the present apparatus is separate and accordingly removable from a carrying sleeve.

In essence, it is a feature of the present invention to construct a target support assembly possessing clamping elements which connect target sleeve with a support sleeve while presenting an optimized degree of thermal and electrical conductivity.

Reverting in greater particularity to the Examiner's rejection of independent Claims 17 and 18, as well as Claims 19-22 which are either directly or indirectly dependent therefrom, Applicants respectfully submit that Claims 17 and 18, as currently on file, are clearly directed to allowable subject matter.

Concerning the foregoing, Applicant note the Examiner contends that the leaf springs in Saunders are angled. However, referring to Figure 2 of Saunders, an angle of these clamping

elements would normally be defined between two even or straight lines; however, the particular clamping element which is described in Saunders possesses only a single even or straight line. Moreover, Applicants respectfully disagree with the Examiner that the clamping elements in Saunders have a base on which opposite ends are wedged between the sidewalls of a recess. However, in actuality, the clamping elements of Saunders possess a single base arm which is not wedged, but rather welded at one end thereof to the electrode, in effect, the support sleeve. Consequently, the base arm in Saunders does not actually possess opposite ends, since the one end which is opposite to that which is welded is the beginning of a curved portion of the clamping element, as illustrated in Figure 2 of Saunders. Applicants respectfully note that the previous Amendment clearly considered the foregoing aspect and distinctions.

Even combining Saunders with Ueda would not, in any manner, disclose nor suggest the present invention as set forth in Claims 17 and 18. Inasmuch as the inventive clamping elements are of an entirely different configuration and construction than those in either Saunders or Ueda, irrespective as to whether these are considered singly or in combination.

Thus, in Ueda, the clamping elements comprise O-rings but not springs, whereby the combination of Saunders with Ueda only provides a vague suggestion adapted to create a cylindrical support sleeve with the clamping elements, or to create a flat support sleeve as in Saunders with the O-rings from Ueda. Whereas only the first alternative set forth in the art has any kind of limited affinity with the present invention, it is crucial to note that the clamping element of Saunders is welded on the support sleeve at one of its ends, whereas, to the contrary, the inventive clamping element as set forth in the pending claims, is only wedged between the walls of the recess in which the former is located.

Moreover, the clamping elements in Saunders are not appropriate for use thereof in clamping two cylindrical sleeves in a radial orientation inasmuch as only the bowed curvilinear part of the clamping element produces a wedging effect which is rather poor in nature in conjunction with the welded end thereof. Thus, any exertion of a radial force against the clamping element would cause a breaking off of the latter. This is because any such radial force would press along the extent of the base arm of the clamping element, whereas pursuant to the present invention, the radial force exerted against the clamping element is effected at a right angle to the base arm of the clamping element.

Consequently, there is maintained the wedged attachment of the clamping element as set forth in the claims herein, but not the fixed/welded attachment of the clamping element as set forth in Saunders. Moreover, it can be contemplated that any mounting the inventive cylindrical target sleeve on the cylindrical support sleeve while using a clamping element or elements pursuant to Saunders would be practically impossible, inasmuch as the Saunders clamping elements provide for a poor radial welding effect, and the welding attachments are subject to stressing in response to mounting thereof. The only feasible way of mounting the target sleeve onto the support sleeve without stressing the welding element (in a lateral orientation), would be to construct a target sleeve with a hinge extending in parallel with the axis of the cylinder. This would, however, be an extremely complicated and expensive solution to the problem and, moreover, is not disclosed or even suggested in either Saunders or Ueda.

Consequently, in summation, with respect to Claims 17 and 18 and Claims 19-22 which are dependent therefrom, these clearly and unambiguously are patentably distinct over the art represented by Saunders and Ueda, irrespective as to whether these publications are considered singly or in combination, and the arguments previously submitted by Applicants in conjunction

with further technological distinctions as set forth herein, clearly emphasize to one skilled in the art that there are significant and patentable distinctions between the construction of the present leaf spring clamping elements and the clamping elements as disclosed in the prior art.

Reverting in greater particularity to Claims 23, 24, and Claims 25-28 which are dependent therefrom, in order to emphasize further distinctions over the art in these claims, respectively, in Claims 23 and 24, Applicants have inserted the further limitation that the base of the recess (8) is concavely rounded and wherein the clamping element (6) is correspondently convexly rounded so as to afford a maximum surface contact between these components as also illustrated in Figure 7 of the drawing in the operative compressed state between the components as shown in Figure 7, and the initial inserted condition thereof in Figure 6 of the present application.

Concerning the art as applied to these claims, i.e, Ueda and Ikeda, and particularly Ueda which discloses a method of manufacturing a cylindrical target including using a damping member (52) such as constituted of carbon felt, between a metal packing tube as an inner tube and a cylindrical carbon material as an outer tube, connecting both components to each other. This increases the capability of selection of a target material and packing tube material supporting the target material, and also the cylindrical targets can be easily manufactured and reused. A cooling member which is formed as a heat resistant O-ring is disposed at the inner surface portion of the target material. Moreover, the O-ring in Ueda has a convexly rounded cross-sectional form; however, the base of the recess in which it is positioned is not correspondingly rounded, contrary to the present invention, and in which the cross-section in the recess of Ueda is of a rectangular or tapered wall configuration. Consequently, the advantages of providing the rounded base in correspondence with the configuration of the O-ring as

provided for by the present invention and the advantages obtained thereby by an increased surface contact area are not at all disclosed in Ueda, and amended Claims 23 and 24, as well as the dependent claims, clearly are novel and patentable thereover.

Reverting to Ikeda, the latter discloses a vacuum sealed structure in a vacuum working device provided to prevent any high frequency electrical wave from leakage, in an economical manner by means of a simple structure through the utilization of a conductive elastic body employed as a vacuum sealing O-ring. This is obtained by the O-ring, having a volumetric resistance value which is less than a specific value distributed over the entire periphery of a vacuum sealing portion. Thus, in the operation of a vacuum working device, a lid (3) which covers the upper surface of a flange (1a) over a chamber (1) has an O-ring (4) fitted in a groove (1b) found in a flange (1a) of a lower chamber (1) that is positioned in an intimate or close contact with a lower surface of the lid (3). This enables a vacuum tank (2) to be completely sealed from the exterior in order to be able to maintain the vacuum condition, and moreover, high-frequency electrical waves from a high-frequency applying section in the vacuum tank (2), while the high-frequency electrical waves are prevented from leaking from a sealing portion of the vacuum working device, since the conductive O-ring (4) extends over the entire periphery of the sealing portion. Thus, when the O-ring (4) has a volumetric resistance value that is less than $5\Omega\text{cm}$, the shielding property can be readily maintained in order to prevent the high-frequency electrical waves from any leakage.

Hereby, the O-ring which is disclosed in Ikeda, having a convexly rounded cross-sectional shape, is arranged in a groove or recess having a base that is not correspondingly rounded, and consequently this results in a reduced contact surface whereas, in addition, the cross-section of the groove is angled in its wall structure, having reference to Figure 1 of the

reference. Consequently, the particular O-ring configuration pursuant to the invention, in cooperation with the correspondingly shaped recess is clearly novel over Ikeda, as set forth in amended Claims 23 and 24, irrespective as to whether Ikeda is considered either singly or in combination with Ueda.

Moreover, a combination of Ueda with Ikeda provides for significant drawbacks in comparison with the present clamping element when in the form of O-rings, as in Figures 6 and 7. Thus, in the prior art there is provided a cylindrical target with compressible electrically conductive, and cross sectionally convexly rounded clamping and sealing elements which are employed in mounting a target sleeve on a support sleeve. The clamping elements are O-rings which are arranged in circumferentially extending recesses each having either a rectangular or angled side walls rather than the curved base portions as provided for by the present invention and claims.

Also, a further major drawback of the prior art structures represented in Ueda and Ikeda resides in that the conductivity between the target sleeve from the support sleeve which is due to the geometry of the O-ring elements and their recesses not being optimized in view of the extremely small contact surfaces which are present between the O-rings which are rounded in transverse cross section, and the shapes of the recesses which are rectangular or angled in their wall surfaces in transverse section, even though the O-rings are essentially of a compressible and somewhat deformable material.

However, the wall of the O-ring does not fully reach and contact the inner corners and wall regions of each respective recess.

In essence, the electrical resistivity of a body having a length L and cross-section A is given by the equation $R_{elec} = \rho \cdot \frac{L}{A}$, wherein ρ is the specific electrical resistivity of the body,

and whereby the higher the amount of the resistance the greater the amount of electrical charges can flow off therefrom. The foregoing is quite similar with respect to thermal conductivity, wherein the smaller the cross-section of the conductor and the lengthier the conductor, the higher is the thermal resistance $R_{therm} = \alpha \cdot \frac{L}{A}$ wherein A is the contact surface between the O-ring and the recess in which the former is arranged.

Even if the material of the O-ring were to exhibit a low electrical resistivity ρ , the cross-sectionally rounded O-ring in contact with the angled wall or recess will still have a relatively high resistivity.

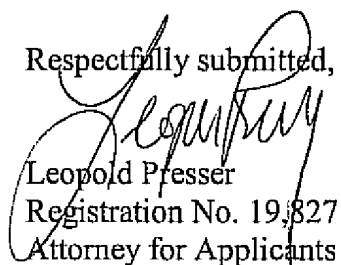
In summation, the construction of the recess shown in Figures 6 and 7 of the present invention, in conjunction with the O-ring when the latter is formed convexly and the recess is formed concavely with a rounded bottom will provide for a contact surface for an O-ring and the recess which is considerably greater than the O-ring and the angled or straight-walled recess disclosed in, respectively, Ueda and Ikeda, notwithstanding the fact that the O-ring is only slightly compressed. Consequently, both as to thermal conductivity and electrical conductivity between the target sleeve and support sleeve the present invention provides superior properties in comparison with the prior art, irrespective as to whether the latter is considered singly or in combination.

Furthermore, also much easier in the current technology and economical to produce concavely formed recess that is formed through milling inasmuch as the excavation or removal of the material is less by milling in comparison with forming a rectangular recess with the same width and depth.

Basically, neither Ueda or Ikeda disclose or suggest recesses which are precisely adapted to the configurations of the O-rings arranged therein. Consequently, both Claims 23 and 24 and the claims which are dependent therefrom, are deemed to be novel and patentable over the art.

In view of the foregoing, comments and amendments presented for the Examiner's consideration, the early and favorable action on the merits, and issuance of a Notice of Allowance is earnestly solicited. However, in the event that the Examiner has any queries concerning the instantly submitted amendment, Applicants' attorney respectfully requests that he be accorded the courtesy of possibly a telephone conference to discuss any matter in need of attention.

Respectfully submitted,



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